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ABSTRACT

Decreasing budgets and enrollments, the reluctance of state legislatures to provide funds for higher education facilities, and the rising costs of energy necessitate the development of space ownership management. Three patterns of space planning problems have developed at different colleges: (1) costly, underutilized facilities due to optimistic overbuilding in the 1960's; (2) facility imbalances across departments and type of facility due to uneven enrollment development in different academic areas; and (3) critical facility shortages at colleges which did not effectively compete for capital funds during the 1960's. All colleges, however, face facility budget constraints due to the need to house and maintain instructional technologies, such as "learning resource centers," and to eliminate architectural barriers for the handicapped. Although colleges rarely repay the tax authorities that provide capital funds, a true space cost formula should be developed which includes capital recovery, as well as maintenance, energy, and depreciation factors. The reduction of these costs can be effected by leveling the distribution of classes throughout the day and week. Since this is accomplished through facility reallocation across several groups, it is important to include faculty, as well as administrators, in the planning process. (Author/JP)

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SPACE PLANNING: A BASIS FOR COST CONTAINMENT

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SPACE PLANNING: A BASIS FOR COST CONTAINMENT

The purpose of this paper is to examine the cost of space ownership and use at the college campus and recommend ways to effect economies through space planning, while maintaining excellence of function. It should be of interest to those persons whose institutions are coping with declining resources, declining enrollments, enrollment shifts, and the need to upgrade or replace outmoded space.

The late 1970's have introduced us to falling budgets, falling enrollments, concurrent program obsolescence and emergence of new programs due to changes in the market place of employment demands and societal expectations. State legislatures across the country are on record that they have provided enough facilities for higher education, and that continued requests are not justified. For institutions who have sufficient space, over the short term the refusal by legislators to fund additional capital expenditures is not a large problem, but even these institutions continue to experience space obsolescence. However, the problems are considerably more serious at those colleges which have never acquired enough space during the 60's and 70's to meet the standards established by state planning agencies.

In addition to declining support from the general public and governing bodies, since 1974 energy costs have increased several fold, posing still another threat to the economic well-being of higher education. This threat has given rise to a number of approaches to the reduction or containment of energy use. But less emphasis has been placed on the potential economies from broader facility management. This paper will show that, at present, the cost of energy is not the major economic threat in the use of space, but other elements contribute even more to the cost of facilities.

The paper will also examine briefly some organizational and human considerations in managing space use. While we are aware of our human tendency to resist change, it is possible to ameliorate this resistence by building awareness through participation in planning. The responsibilities of various segments of the college organization--the president, planning officer, other administrators, department heads and faculty--are examined briefly. The paper advocates the need for communicating with all staff members about the political and economic realities of space use, development of guides and procedures for space planning, and operational details of space use. It is noted that "playing close to the chest" by administrators works against acceptance and understanding of economical and effective space use.

Changing Patterns of Enrollment

While it is generally accepted that enrollments in higher education are declining, the pattern is far more complex than that. It will help for our purpose to depict some of the complexities which are related to enrollment patterns.

One type of enrollment pattern has occurred at those institutions who planned for continuation of the massive enrollment increases being experienced during the 60's. Since there was inadequate external review to temper the excessive optimism within the institutions, there is today a sizable number of institutions whose overall physical plants are grossly overbuilt (Quote Texas data, and from other states). At other colleges, enrollments were in line with projections through 1975, but have failed to meet projections since then, or have even declined. Now, the declining numbers of high school graduates through the next decade assure that enrollment declines will continue, at least for most traditional college programs.

These colleges have underused dormitories, classrooms, and related facilities, while inflated maintenance and operating budgets drain funds away from essential functions. Some of these institutions are now undergoing reductions in faculty, not only because enrollments are not there to justify them, but also because appropriations are insufficient to support a staff needed to provide high quality educational programs.

A second enrollment pattern is one of selective increases and declines in enrollments across educational programs. For example, enrollments in teacher training programs have declined significantly over the past five years, while enrollments in business and certain technologies have increased. A problem which results is one of facility imbalance across departments and types of facilities. This problem calls for reallocation and renovation of facilities, and even affords opportunities for certain reductions in space use costs.

A third pattern exists, often at community colleges and sometimes at state colleges who did not compete well with more prestigious institutions for capital funds during the past decade. These institutions may have gross space deficiencies of 20, 30 or even 50 percent based upon the guidelines administered by state control agencies (See data for Texas, other states). They have problems quite different from colleges which have excess space. They face acute space needs, while the public will to provide additional capital funds has all but disappeared. For them, a stable enrollment or even a decline might be welcome relief. Opportunities for applying space management techniques at these institutions will be marginal, occurring only as space needs in certain programs diminish and allow reallocation of these areas to other programs.

Changing Technology and Faculty Roles

Regardless of the pattern of enrollment change, we all face the continuous introduction of instructional technology to enhance the learning process. The "Mark Hopkins on a log" approach to education is long obsolete, not only because of its high cost, but also because of available technology to aid in the instructional process. Most institutions now have "learning resource centers"

on their campus where formerly they had "libraries." The printed book, the result of the technological innovation probably most significant to education in Western society, is being rapidly complemented and replaced by materials produced by the media services center. These new materials are supported by equipment maintenance and distribution centers, audiovisual learning carrels, and computer terminals.

Without question, new innovations do enhance and speed up the learning process for many students, but they also require a growing proportion of the operating budget, and, a growing proportion of the physical plant as well. Because of emerging technology, continued consideration must be given to the type of faculty housing, the number of faculty or student faculty ratios, and the type of instructional facilities which are needed.

Certainly, classrooms and laboratory facilities will change. At our college, we are developing more and more specialized classrooms and laboratories. Back in the 1960's, the foreign language laboratory with its array of carrels, individual headsets, and elaborate instructor controls was added to the campus. More recently we have added similar things for instruction in basic English and mathematics, for skills of typing, shorthand, accounting, and on it goes. We are confronted with a situation in which faculty increasingly use these innovations well, but are reluctant to give up existing general classroom space to house the new specialized technology. The issue of changing student-to-faculty ratios has not emerged clearly yet, but it is clear that if we simply add the new instructional technology to existing facilities, we will certainly raise both our direct instructional cost and the cost of space. The point of relevance here is that facilities will be needed to house new instructional methods, and we either convert existing facilities or add new ones.

Accessibility to the Handicapped

I venture that everyone in this audience is aware of Section 504 of the Rehabilitation Act of 1973. It has been on our national agenda for several years and promises to remain for years to come.

Frankly, I think we should look upon the requirement to provide accessibility to the wheelchair-bound individual and to those with related handicaps as an opportunity to extend our service and our calling. There are surely some budgetary hardships to be endured by providing for broader accessibility, but the service opportunity is often compelling. Our college now serves 21,000 different students across a twelve-month period, either full-time or part-time. Based upon these enrollments and the population which we serve, we anticipate that between 150 and 180 additional non-ambulatory persons will be served annually, once our campus becomes reasonably accessible. Our preliminary one-time-only cost estimate for effecting accessibility amounts to between $1,700 and $2,000 per handicapped student. And if we consider the number of students who would be served each year, and prorate the cost over 10 years, the real cost per handicapped student is reduced to about $200.

The point of introducing accessibility to the handicapped is that it represents a capital outlay which our institutions must make, an outlay which may detract from funds which otherwise might be available for space development.

Model of Space Cost

In order to plan to minimize the cost of space use, it is helpful to have a model for viewing the cost elements. The model which follows includes the following elements: depreciation, energy, maintenance and related operating expense, and full capital recovery of the original cost.

Cost Elements of Higher Education Facilities

Depreciation - original cost divided by the expected life of the facility.

Energy - heat, light, air conditioning, etc.

Maintenance - maintenance and operations expenses.

Capital Recovery - needed to pay interest on and recover the original investment.

Debt service and depreciation are often not considered as facility cost elements by public institutions, as they usually do not repay the taxing authority which provides capital funds. But the inclusion of capital recovery and debt service are necessary to provide a fair economic comparison with alternative investments which society might have made. You may think this is unfair, but the folks from the local Taxpayers' Association will remind you vividly that there are indeed other things to do with the money spent to expand your campus.

I have summarized the elements of cost of space ownership at one college to illustrate their actual and relative values. The tabulation includes an assumption of $40 per sq. foot original cost (right columns only; left columns reflect $20 original cost), depreciation over a 40-year period, the college's actual expenditure for maintenance and operation associated with facilities, and a 10 percent rate of return on the original investment. All costs were first computed on a gross square foot basis, and adjusted to reflect the cost if borne by educational and general space alone. The E&G cost was 1.7621 times the cost of gross space.

The first tabulation includes straight line depreciation and ignores interest charge on the investment. The second tabulation includes a total capital recovery charge--interest plus recovery of the original investment.

COST OF HIGHER EDUCATION FACILITIES

Include Depreciation, But No Interest on Original Investment

	$20/Sq. Ft.		$40/Sq. Ft.	
	Gross Sq. Ft.	E. & G. Sq. Ft.	Gross Sq. Ft.	E. & G. Sq. Ft.
Depreciation	$ .50	$ .88	$1.00	$1.76
Energy	.46	.81	.46	.81
M. & O.	1.02	1.80	1.02	1.80
TOTAL	$1.98	$3.49	$2.48	$4.37

Include 10 Percent Interest with Capital Recovery Method

Capital Recovery	$2.05	$3.61	$4.09	$7.21
Energy	.46	.81	.46	.81
M. & O.	1.02	1.80	1.02	1.80
TOTAL	$3.53	$6.22	$5.57	$9.82

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The annual cost of gross space costing $40 per square foot, ignoring interest, is $2.48. This cost increases to $4.37 when charged only against educational and general (E&G) space.

Using a full capital recovery model--including 10 percent interest plus recovery of the original capital--the annual cost per square feet is $5.57 against gross space and $9.82 against only E&G space.

Naturally, the annual cost of space built years ago at $20 per square foot would be less, as can be noted on the tabulation.

You might want to calculate the cost of your campus by using your actual costs in the model. At any rate, the true cost of owning and using building space is high, and you might consider charging departments for the space they use; it might give them an incentive to use it prudently.

A most interesting aspect of this tabulation is the relative size of the four cost factors. In descending order of significance (for $40/sq. ft. construction) they include first, total capital recovery; second, maintenance and operating cost, not including energy; third, depreciation of the original building with no interest charge; and last, energy. In the capital recovery model, capital recovery comprises three-fourths (73%) of the total cost; maintenance and operations, one-fifth (18%); and energy, under one-tenth (8 percent).

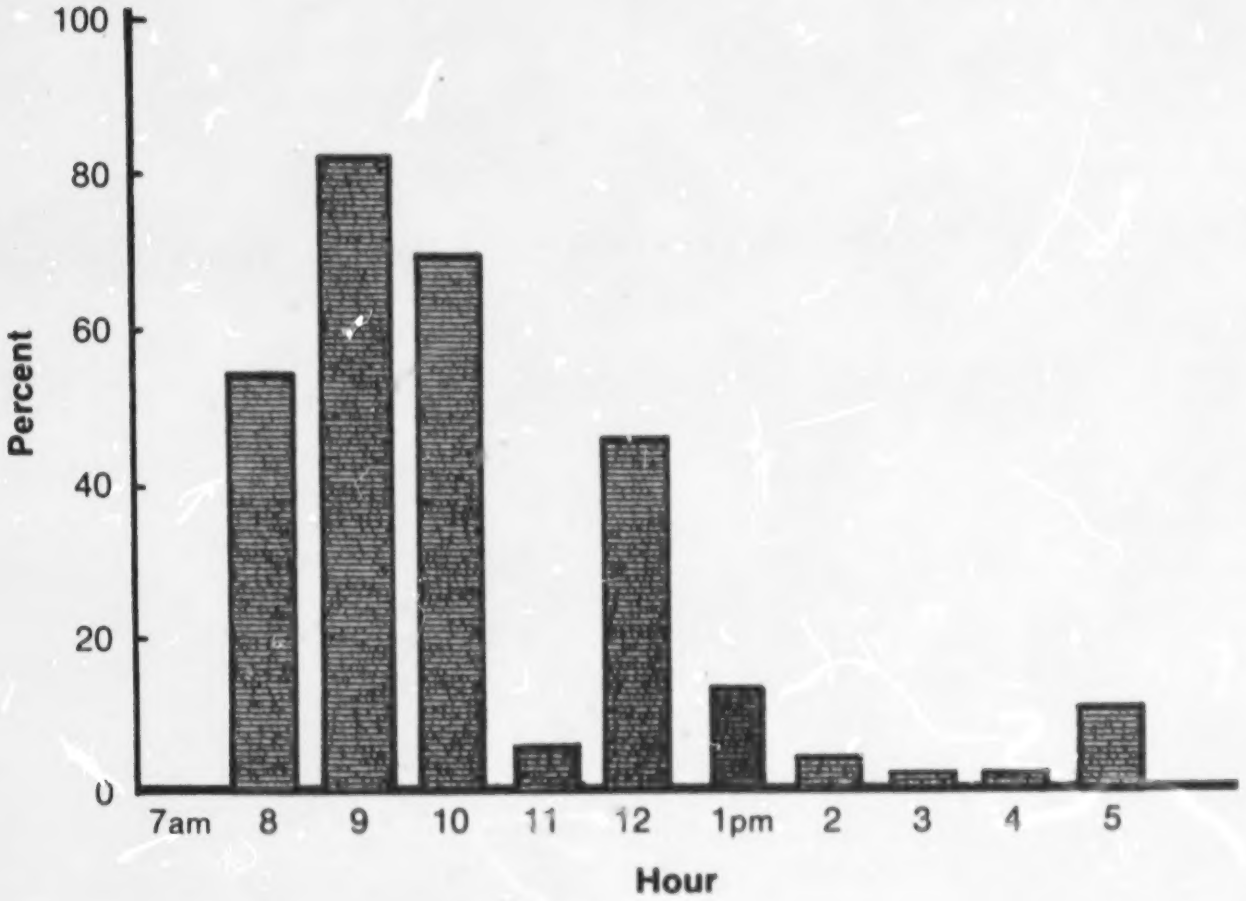
On older buildings, assuming $20 construction cost, capital recovery and depreciation are reduced to about one-half of that for $40 space, while maintenance and energy costs remain the same. Notice that I am ignoring the possibility of lower energy cost for new construction.

Reducing Cost of Space Use

I think we would agree that debt service must be considered as an economic cost to society of operating a college. The man in the street may not say it well, but he thinks increasingly that we spend too much money. For an illustration of this attitude we need only to look at the extreme scrutiny to which the operation and new building proposals of the local public schools are subjected. So, while we do not actually repay our construction cost with interest, we need to acknowledge its reality to the general public, and plan a prudent course of operation. Consistent with this thinking, the following ideas are presented to reduce the cost of space use while maintaining quality of education and service.

The class schedule should be planned to maximize the use of existing space and minimize peak loads. The distribution of classes across day hours for one college is attached, to show both the effects of overbuilding and concentration of classes during several morning hours. Although the evening schedule is not shown on the attachment, the classroom utilization rate for several nights of the week exceeds

Percent of General Classrooms Used



80 percent. Obviously, peak class loads are very expensive to support, and scheduling classes across the entire day and evening hours is one way to reduce them, a practice often neglected at public institutions, at least.

A number of colleges have been successful in introducing a weekend schedule of classes. This approach provides additional educational service to the community and also results in spreading essentially fixed overhead costs of space over a greater number of classroom hours. It is through the extended use of facilities that significant savings will result; over the long run the three to four day week is a gross waste.

Where emerging programs require additional space or upgraded space, thought should be given to renovating existing buildings rather than building new ones. The capital outlay will be considerably less than for new construction. Also, careful plans should be made for the flexible use of the facility during future years. Flexibility may be included at little or no extra cost, and sometimes less. Reduced cost of mechanical and lighting systems may be realized through the design of semi-open flexible space.

Finally, if we are to manage space to get the greatest use from it, management systems must be developed to control space use at targeted levels. The cost of such a system may not be cheap, but it will certainly cost less than continued space under-utilization.

Organizational and Human Considerations

And now, some thoughts on human considerations. Space planning is not a smooth or easy process. There are a number of technical and diagnostic problems, to be sure, but the organizational and human considerations which come into play are crucial. And they are often contradictory. The student must be housed and provided with facilities to maximize the instructional/learning process; faculty and staff must be housed to suit their needs and functions; and the community must have evidence that the college is attractive, effective, and economical. And these conditions must be maintained across changes in enrollment levels, instructional technology, programs, and levels of community support. Clearly, the college planner must be flexible in his use of rational standards, intuition, and political judgment. (Tell a story or two here!)

Unfortunately, space planning usually implies, or actually results in, reallocation across several groups, or taking space used by one group and assigning it to another. Maybe that's why we resist change; we don't want to give up our turf; on the contrary, we want to expand it. Schumacher's Small Is Beautiful premise runs counter to our acquisitive culture. We are rewarded for growth, even if it drives us to poverty or distortion of our goals and other values. But we also have a noble side, and college planning must be conducted in an environment which encourages it. Faculty and staff members may only partly perceive motives for planning space changes. They lack planning experience and are skeptical of the words, tools and assumptions of planners. They (and we) tend

to hold on to what they have. In addition, administrators are often ill-equipped to explain the need for space planning and changes to the faculty. Therefore, if a college campus is to optimize the use of its space across time and changing conditions, it must deal effectively with the human condition. With this in mind, responsibilities for space planning must be assigned across levels and areas of the institution.

The President. Except at very large institutions, the President must play a key role. At the very large institutions this role may be assigned to an executive vice president, provost or vice president for planning. Or, the role may be shared at several of these levels. The President must establish and communicate the general purpose of space planning and assign responsibility for it. He must relate space planning to the larger scope of college planning and development. He must meet as needed with individuals or groups on campus who are involved in or affected by the planning process and objectives, and articulate beyond the college community the goals and objectives of college planning and development.

Planning officer. The Planning officer must establish a general statement of conditions of existing facilities and future needs. He must coordinate and help develop the process, policies, guidelines and procedures for identifying space needs and meeting them. Along with the President, he must articulate the goals and objectives of college-wide planning and space planning. He must be sure that affected groups are involved in the planning process. And he must recommend specific approaches to the President to meet space needs.

Line administrators. Line administrators must be informed about the status of available facilities, including how they are used and trends in their use. They must communicate this information to division or department administrators and faculty, and provide them with assistance in reviewing existing space conditions, identifying emerging needs and recommending action. They must be acquainted with the planning process and procedures, and assume a college-wide perspective position on many issues of space planning and use, through both direct participation and review of planning going on in other areas of the institution.

The faculty. The faculty must be informed about institutional planning goals, policies, procedures, guides, and assumptions. Faculty individuals should participate in certain college-wide planning and development projects in order to contribute their specialized expertise and become familiar generally with the planning function. They need obviously to participate in planning for their local department.

The Planning officer and others must recognize the necessity of helping other administrators and faculty develop and maintain a balanced view about college space. One result of implementing the planning function "too close to the chest" is that others are unable to develop an understanding about it, and to develop a commitment to both a college-wide and departmental perspective. The college staff should know about the total press on the institution related

to planning, such as the realities of external funding and control--its limited availability, the power and responsibilities of state agencies, planning guidelines, and federal and state legislation--and the realities within the institution--budget limitations, and enrollment patterns and trends. It is necessary for faculty to have a balanced view of their roles, both as masters of their craft and as public servants who see the supporting public as potential clients, clients who can offer or withhold their purchases and their support from the college.

As faculty and administrators participate in the planning process, their understanding and commitment may be enhanced, enabling them to join more fully as planning partners.

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